and also the theory that accounts for maturation on the ground that it is getting rid of the male element of an originally hermaphrodite egg nucleus.

4. All theories must be rejected which consider fecundation as the furnishing by the male of the number of chromosomes subtracted by the polar globules. The loss of one-half of the chromatic matter does not, of itself, prevent the egg from developing, for the half number of paternal chromosomes can make the egg develop.

5. The sexual attraction is not located in the nucleus.

6. Two things must be distinguished in fecundation: (*a*) the communication to the egg of a vital energy which permits it to segment and to develop; (*b*) the communication to the product of the advantages resulting from amphimixia and the possession of the paternal hereditary characters. As for the second point, my experiment furnishes no indication; as for the first, it shows that the theories of fecundation reconcilable with it are those which present the phenomenon as the conveyance by the male of a special energetic plasm (*Kinoplasma*) contained perhaps in the spermocenter.

7. There is in the ovular cytoplasm no fixed specific architecture whose conservation is a condition of development; if a structure exists, it is conditioned by the mutual reactions of parts and can reëstablish itself as often as it is altered.

8. The celebrated experiment of Boveri, so strongly contested, especially by Seeliger, is demonstrated, if not true, at least possible; the gravest objection that has been made to it (the impossibility of the development of an ovular cytoplasm without nucleus) being experimentally suppressed.

Temperature and Rate of Regeneration.[1] — It has long been known that in every organism there is an optimum temperature for growth above and below which growth occurs more slowly. That the same is true of regeneration has been shown by the recent work of Lillie and Knowlton on *Planaria torva*. Miss Peebles has done similar work on *Hydra grisea* and *H. viridis*. At 18–24° C., of *H. grisea* there regenerated in 2 days 0%; 3 days, 26%; 4 days, 95%; of *H. viridis*, 2 days, 38%; 3 days, 100%. At 26–32° of *H. grisea* there regenerated in 2 days, 75%; 3 days, 100%; of *H. viridis* in 2 days, 98.5%; 3 days, 100%. At 12° C. there regenerated of *Hydra viridis* in 4 days, 13%; 5 days, 24%; 6 days, 71%; 7 days, 100%.

[1] Peebles, Florence. The Effect of Temperature on the Regeneration of Hydra, *Zool. Bull.*, vol. ii, pp. 125–128.

At 38° C. polyps did not regenerate, but died. Hence the optimum lies between 30° and 38° C. *H. grisea*, at the room temperature (18–24° C.), regenerates more slowly than *H. viridis;* but it is relatively more accelerated by the increased temperature.

Experiments upon the relative effect of light of different wavelengths resulted negatively; but these experiments do not seem to have been carried out very thoroughly.

Organisms and Oxygen.[1] — That oxygen is necessary to the life of organisms is a dogma which seemed to have received a severe shock when the facts of anærobic bacteria (which are killed by the presence of free oxygen) became known.

Errara points out that after all this necessity for oxygen is one of degree. As there are certain species which need a large amount of oxygen, so there are others which have a very low optimum of oxygen supply; such are the anærobic forms. In the presence of a larger amount of oxygen they thrive less well, and may even die.

The Phylogenetic Significance of Protozoan Nuclei.[2] — The minute structure of the nuclei of Tetramitus, Microglena, Synura, Chilomonas, Trachelomonas, Stylonychia, Amœba, Euglena, Ceratium, Peridinium, and Noctiluca has been carefully investigated by Mr. G. N. Calkins. A considerable variety of nuclear types is recognized, the simplest of which is the distributed nucleus, which consists of isolated chromatin granules scattered about in the cell. Nuclear membrane and linin threads are absent; there is, however, a cytoplasmic body near which the chromatin granules gather at the time of division; the activity of this body is analogous to that of the centrosphere of more highly organized cells. Nuclear conditions of this type are found in Tetramitus. A higher form of structure is found in the "intermediate" type of nucleus which occurs in Microglena, Synura, Chilomonas, the euglenoids, in which the attraction-sphere is intranuclear, definite in form, deeply staining and active, and the chromatin granules are massed about it permanently, as in the forms just mentioned, or only during division, as in Paramœba. A nuclear membrane is found in the case of some nuclei of this "intermediate type." In higher types of nuclei the attraction-sphere is no longer intranuclear, but this position of vantage is taken by

[1] Errara, L. Tous les êtres vivants ont-ils besoin d'oxygène libre? *Rev. Scientifique*, (4) X, 688, 689, 26 Nov., 1898.

[2] Calkins, Gary N. The Phylogenetic Significance of Certain Protozoan Nuclei, *Annals N.Y. Acad. Sci.*, vol. xi (1898), pp. 379–400, Pl. XXXV.